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ParticlePair

An optical pairing lab that hides a one-time secret inside an animated particle galaxy and recovers it with camera-based verification.

About

ParticlePair is an optical pairing secret tool for hiding a one-time secret inside an animated particle galaxy and recovering it with a camera. It presents a live particle broadcast, then reads the code back from consecutive frames using an error-protected optical channel. The demo centers on a 128-bit secret, version data, and CRC-CCITT validation, with a loopback self-test and a camera scan flow for verification.

What is ParticlePair

ParticlePair is an optical pairing secret lab built around a screen-to-camera transfer flow.

recover that secret from the rendered frames on another device.

This optical pairing secret workflow is designed as a proof-of-concept for out-of-band authentication, not as a general encryption product. The site describes itself as source-available, noncommercial, and experimental, and it frames the visual signal as the transport layer while cryptography remains the boundary.

The app exposes a live optical signal, a generation step for the pairing secret, a camera receiver, and a decoded result panel. The protocol details shown on the page include a 128-bit secret, a 300 ms phase, CRC-CCITT checks, and an inner 18×18 optical grid.

Key features

ParticlePair focuses on a narrow but technically specific optical pairing secret pipeline.

- One-time secret handling: the page supports generating or entering a 16-byte secret, which is then encoded for visual transmission.
- Animated particle broadcast: the pairing secret is rendered as a flowing particle cloud rather than a plain text code.
- Error correction: the protocol notes Hamming(12,8) encoding, which can repair a single-bit error in each byte.
- Frame validation: the receiver rejects frames that do not match the protocol header or CRC.
- Camera alignment guidance: the scanning view asks the user to align the complete particle square inside a guide before starting the scanner.
- Loopback testing: the interface includes a self-test area for verifying whether the rendered pixels can be read back correctly.
- Open protocol details: the page surfaces implementation notes such as 252 data bits, opposite-phase comparison, and border synchronization.

For anyone studying an optical pairing secret system, the most notable part is that the app shows both the visual broadcast and the decode checks in one place. That makes it easier to inspect how the particle-based transport behaves before trusting it in a broader flow.

Generate or enter a 16-byte one-time secret in the pairing secret field.

Let the app render the animated particle code in the live optical signal panel.

Run the loopback self-test if you want to check whether the rendered-pixel path is working.

On a second device, open the camera receiver and position the screen so the full particle square fits inside the guide.

Start the camera scanner and wait for the decoder to synchronize on the border and compare the frame phases.

Read the result only after the protocol header and CRC validation pass.

Because this is an optical pairing secret demo, success depends on the camera view, the display framing, and the animated frames being captured consistently. The site explicitly notes that a valid result appears only after validation.

Who it is for

ParticlePair is for people who want to explore an optical pairing secret channel in a browser.

Security researchers who want to inspect an out-of-band pairing prototype.

Developers who need to understand how visual signaling can carry a short secret.

Protocol designers comparing camera-based transfer against QR-style pairing.

Experimenters who want to see an animated secret transmission rather than a static code.

It is also useful for readers who care about the mechanics of optical authentication. The app shows the protocol pipeline, including packet formation, error correction, modulation, and recovery, so the optical pairing secret process is easy to follow step by step.

What to know before you use it

ParticlePair is not a production-grade authentication system. The page states that the project demonstrates an optical out-of-band authentication link, and it warns that production pairing must continue with an authenticated key exchange after recognition.

The app is experimental and source-available, not a finished security product.

The visual channel is only the carrier; it does not replace authenticated cryptographic exchange.

The decoder can reject frames when the header or CRC fails, so noisy camera conditions may prevent recovery.

The site says no real canvas pixels have been read yet in the loopback test area, so the self-test status may be limited until the rendered-pixel path is exercised.

If you need a hardened pairing workflow for real devices, use an official authenticated exchange method instead of relying on this optical pairing secret demo alone.

In short, ParticlePair is best treated as a technical optical pairing secret prototype and learning tool. It is valuable for understanding how an animated particle channel can carry a short secret, but the final security decision should come from a proper authenticated protocol, not from the visual demo itself.

FAQ

What is ParticlePair?

Is ParticlePair free to use?

How does ParticlePair's optical pairing work?

What does ParticlePair actually do?

Is ParticlePair secure for production use?

Do I need a second device to use it?

What platforms does ParticlePair support?

Is ParticlePair free?

What platform does ParticlePair run on?

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Platform	Web
Launched	Aug 2026
Updated	12 days ago
Verified	1 months ago

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optical pairing # camera scanner # out-of-band # camera
out-of-band authentication # web app # protocol demo # secret sharing

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